AN ESSAY,

Concerning the CAUSE of the

ENDEMIAL COLIC OF DEVONSHIRE,

Which was read in the THEATRE of the COLLEGE of PHYSICIANS, in LONDON, on the Twenty-ninth Day of JUNE, 1767,

BY GEORGE BAKER,

Fellow of the COLLEGE of PHYSICIANS, and of the ROYAL SOCIETY, and Phyſician to her MAJESTY's Houſhold.

Ἐκ τούτων νοσοῦμεν, οἷς καὶ ζῶμεν.

PLUTARCH.

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M.DCC.LXVII.

BRITISH MUSEUM

TO

Sir RICHARD WARWICK BAMFYLDE,
BARONET,

AND

JOHN PARKER, ESQUIRE,

THIS

E S S A Y,

ON A

SUBJECT PARTICULARLY INTERESTING
TO THE COUNTY, WHICH HAS THE
HAPPINESS OF BEING REPRESENTED
BY THEM IN PARLIAMENT,

IS,

WITH THE GREATEST RESPECT, INSCRIBED

BY

THEIR MOST OBEDIENT,

AND MOST HUMBLE SERVANT,

GEORGE BAKER.

AN ESSAY

Concerning the CAUSE of the ENDEMIAL COLIC OF DEVONSHIRE.

A VERY ſmall acquaintance with the writings of Phyſicians is ſufficient to convince us, that much labour and ingenuity has been moſt unprofitably beſtowed on the inveſtigation of remote and obſcure cauſes; while thoſe, which are obvious and evident, *quæ ante pedes ſunt*, which muſt neceſſarily be acknowledged as ſoon as ſtumbled upon, have

been too frequently overlooked and diſregarded. Such a ſpirit of inveſtigation has, in ſeveral inſtances, been the parent of dangerous errors in practice; inaſmuch as Men are apt to be as partial to their own conceits, as to their own offspring; and ſeldom forget opinions at the bed-ſide, which have been the reſult of much contemplation at home. It muſt however be acknowledged, that ſuch a ſpirit is a fault not ſo much to be imputed to the preſent, as it was to the laſt age. We have now learned to attend to Nature; to obſerve diſeaſes, and the genuine effects of medicines on the human body; and to make experiment the great *baſis* of our reaſoning. And although, in many caſes, we ſubſcribe to the doctrine of that ſect of

Phyſicians,

Phyſicians, who, according to Celſus, called themſelves Ἐμπειρικὸς, *ab experientia*, that *non interſit quid morbum faciat, ſed quid tollat*; yet we are not ſuch Empirics, in the modern ſenſe of the word, as to pay no regard to thoſe cauſes, which are manifeſt and within our reach; ſuch cauſes more eſpecially, as lead us directly either to the cure of diſeaſes, or to the prevention of them.

With reſpect to the provincial diſeaſe, which is the ſubject of this eſſay, I ſhall at preſent content myſelf with conſidering its origin. And if I am not miſtaken in that, it would ſeem that, in this inſtance, *cognitio cauſæ morbum tollet*; that an obvious method is pointed out, by which this colic may become no longer an ende-

mial diſeaſe in one part of England; and perhaps, in other parts, leſs frequent than it is at preſent. A malady, ſo formidable as well in its immediate effects, as in its more diſtant conſequences, it is an office of humanity, as much as poſſible, to prevent. We may gain credit even in avoiding an enemy of ſuperior force; and when we find ourſelves unequal to the contention, it is a kind of victory to make our eſcape, —

fallere & effugere eſt triumphus.

The earlieſt account of the Devonſhire colic, which I have met with, is in Dr. William Muſgrave's *Diſſertatio de Arthritide Symptomatica*, publiſhed in the year 1703. In the fifth ſection of the tenth chapter *de Arthritide ex colicâ*, is the following paſſage. "Alia

"vero

" vero colica, apud Damnonium, ex " pomaceo immiti et acido, nimis " uſurpato, derivatur ; id quod ex eo " liquet, ſiquidem illos ſolum infeſtat, " qui potioni iſti aſſuevere, eademque " ratione qua ſunt aſſueti : ſic ut iis " tempeſtatibus, quæ pomaceo abun- " dant, creſcat, & in vulgus ea graſſe- " tur; contra vero, Pomona copiam " negante, rarius obverſetur." It ſeems very particular, that Dr. Muſgrave ſhould ſay ſo much of this colic, which is repreſented to be the effect of cyder ; and not mention thoſe eſſential and pathognomonic ſymptoms, by which it is at this time diſtinguiſhed. Are we to ſuppoſe that, when Dr. Muſgrave lived, this ſpecies of colic had not been obſerved to terminate in palſy, or epilepſy ? Or is it more probable,

bable, that his attention was ſo engroſſed by the general ſubject of his diſſertation, that he forgot to mention ſuch remarkable *phænomena?* That he was well acquainted with a diſeaſe exactly ſimilar to Dr. Huxham's *morbus colicus Damnoniorum*, namely the colic of Poitou, is very certain; for in the fourth hiſtory of the ſame tenth chapter, he mentions the caſe of a gentleman, who "ætatis flore, colica, "quam Pictonicam appellant, ali- "quamdiu vexatus, ex more et pro- "greſſu iſtius mali ordinario, incidit "in paralyſin; artus exinde marcidos, "graciles, ἀνινήτους habens; per reli- "quum vitæ clinicus. Paralyſi ſub "ejus initium acceſſerunt dolores er- "ratici, incerti, horum, illorum artuum "internodia cruciantes, autumno et

"tem-

" tempeſtate pluvia maximopere ſævi-
" entes, et ad amuſſim rheumatiſmum
" ſimulantes."

It is indeed poſſible, that Dr. Muſgrave might not often have ſeen the colic, which he mentions as peculiar to the drinkers of cyder; for, as I am informed, orchards were not in his time much cultivated in the country near Exeter, where Dr. Muſgrave reſided; and there was no county-hoſpital at that time eſtabliſhed. And Dr. Huxham teſtified in the year 1739, that there was at that time ten times more cyder made and drunk in the County, than there had been about thirty or forty years before.

Dr. Huxham's *opuſculum de morbo colico Damnoniorum*, which he firſt publiſhed in the year above-mentioned,

contains a very full deſcription of the malady, which is the ſubject of our preſent inquiry. He informs us, that "in "the beginning of the Autumn 1724, "it ſpread itſelf over all the county "of Devon, among the Populace "eſpecially, and thoſe who were not "very elegant and careful in their "diet; and that, though it may "not rage with the ſame degree of "violence, and may affect a vaſtly "leſs number of People, yet it infeſts "that County more or leſs every Au-"tumn." Whoever peruſeth Dr. Huxham's deſcription, will readily determine the *morbus colicus Damnoniorum* to be preciſely the ſame diſeaſe, which, in the year 1617, was deſcribed by Francis Citois, a native of Poitiers, afterwards Phyſician to the King of France,

France, and to the Cardinal Duc de Richelieu, under the title of *novus & popularis apud Pictones dolor colicus bilioſus*. Indeed it ſeems to be acknowledged by Dr. Huxham, that what is called *Colica Pictonum*, "which kind "of diſeaſe," ſays he, "is very com-"mon in the Weſt-Indies," is ſimilar to the diſeaſe which he deſcribes; "ariſing from a ſimilar cauſe, to wit, "too * great an uſe of the very acid "juice of lemons, and requiring much "the ſame method of cure."

Dr. Huxham refers the cauſe of the Devonſhire colic principally to a very groſs, eſſential, acid ſalt, or tartar, with which the expreſſed juice of ap-

 ples,

* I am credibly informed, that, at this time, both in the Weſt Indies, and in the northern colonies of America, the juice of lemons and limes is not only much truſted to as the cure of this diſeaſe, but that it is even eſteemed to be a preſervative from it.

ples, whilſt unfermented, abounds. He thinks that "by long and frequent "drinking a liquor of this kind, ſuch "a quantity of crude, groſs tartar is "thrown into the blood, that it "thence becomes very acrid; and "not only the blood, but, from that "impure ſource, all the humours "thence ſecreted. So that inſtead of "a very ſoft, lubricating *mucus* ſe-"parated by the glands, diſcovered by "Dr. Havers, we have as it were a "ſharp, coagulated matter, whence "ariſes a great pain in the joints, and "impotence of their motion.—In-"ſtead of an exceeding ſoft lymph "to moiſten the nerves, a corroſive "ichor; and hence epileptical attacks. "Moreover, the blood being ſaturate "with ſuch a great quantity of ſalts,

"they attract one the other ſtrongly;
"and form greater *moleculæ* than can
"paſs through the lymphatic ar-
"teries, ſcarce indeed through the ſan-
"guineous capillaries; hence various
"obſtructions, and great irritation on
"the nervous extremities. At length
"even the very Bile, that variouſly
"uſeful balſam of the body, becomes
"corrupted and quite enervated by the
"ſuper-abundant apple-acid, though
"in its natural ſtate it was deſigned
"to correct acidity *."

Thus I have extracted a ſpecimen of Dr. Huxham's doctrine; and for the remainder of his very ingenious theory I ſhall refer you to the treatiſe

* See Dr. Huxham's treatiſe on the Devonſhire colic, tranſlated from the Latin original, and publiſhed with the Doctor's approbation.

itſelf; where you will find a ſentiment, which perhaps is applicable on the preſent occaſion.—"Sine experientia "vana omnis theoria, bella ſit utcun- "que." For, notwithſtanding the deference, which I always pay to the authority of this celebrated Phyſician, I have for ſome time conceived doubts concerning the ſolidity of this doctrine. When I have conſidered, that there is not the leaſt analogy between the juice of apples, and the poiſon of lead; and that this colic of Devonſhire is preciſely the ſame diſeaſe, which is the ſpecific effect of all ſaturnine preparations; it has not ſeemed to me at all probable that two cauſes, bearing ſo little relation to one another, ſhould make ſuch ſimilar impreſſions on the human body. No author, whom I have

have had an opportunity of consulting, has given any intimation of having conceived the same suspicion with myself, except only the anonymous author (supposed to be M. Bouvart) of *Examen d'un livre qui a pour titre T. Tronchin de Colica Pictonum, par un Medecin de Paris.* This writer says, in a cursory manner, and without seeming to lay any stress on what he throws out, "Il "est possible, que les vins, dont parle "Citois, et les cidres, dont parle M. "Huxham, aient eté, sans qu'ils l'aient "pu découvrir, alterés avec la litarge, "ou quelque autre matiere semblable." It is evident however from what this Author afterwards says, in the forty-sixth page, that he was very far from forming any settled opinion on this subject. "Ces trois causes, sçavoir la

bile,

" bile, les matieres minerales veni-
" meuſes, et les vins verds et auſteres,
" quoique differentes en apparence,
" produiſent, malgrè ce qu' en peut
" dire M. Tronchin, des coliques à
" peu près de même eſpece."

But to return to Dr. Huxham.—And firſt, how much ſoever our Cyder may agree with Rheniſh and Moſelle wines in the circumſtance of containing a large quantity of eſſential ſalt, of a ſimilar figure; no argument, from analogy, will here be valid, unleſs it can be ſhewn that Rheniſh and Moſelle wines have ever produced the colic of Poitou in an unadulterated ſtate *.

Secondly,

* Ce qu' il y a de certain, c'eſt que la colique, dont il eſt queſtion, a etè epidemique dans les pays ou l'on boit des vins de

Secondly, if Cyder is the cauſe of this diſeaſe, as being an acid, why is the colic of Poitou very little known in the eaſtern countries, where the Turks, whoſe religion obliges them to abſtain from wine, drink every day very large quantities of an acid ſherbet? Does the experience of Jockeys, who, in order to reduce themſelves to a certain ſtandard of weight by ſweating, are ſaid to drink largely of vinegar, ſtrengthen ſuch an obſervation? Do we find it to be true, that children, and valetudinary people, and particularly chlorotic girls, whoſe *primæ viæ* abound with acid, are on that account ſubject to this colic? Is not a *Diar-*

Rhin et de la Moſelle. Ces vins pechent ſouvent par trop verdeur; et les Marchands les ont long tems alterè avec litarge. [Examen d'un livre qui a pour titre T. Tronchin Colica Pictonum, par un medecin de Paris, p. 7.]

rhœa,

rhœa, or *Cholera*, the ordinary effect of eating unripe fruit immoderately? What reaſon can be given, why the poorer inhabitants of the counties of Worceſter, Glouceſter, and Hereford, who uſe, as their common drink, a weak acid cyder, are ſubject to no ſuch colic? Why is this diſeaſe no longer endemic in the province of Poitou? Is it that the grapes are brought to more maturity, than they were formerly? Has the Sun more power now, than in the time of Citois? Why, in the Bahama-iſlands, is this diſeaſe unknown? I am informed by a gentleman, who lived there many years, that this has been the caſe, ever ſince rum has been no longer deſtilled in thoſe iſlands. The ſame gentleman informs me, that the inhabitants drink

very

very large quantities of ſmall punch, made extremely acid with the juice of limes; the labouring people to the amount of two gallons of it every day. And laſtly, is it reaſonably to be ſuſpected, that the eſſential ſalt of a vinous liquor can raiſe ſuch tumults in the bowels, whether by corrupting the Bile, or otherwiſe; when it is vulgarly known, even among the Miners in Derbyſhire, that Patients, afflicted with this ſame diſeaſe, do not receive a more immediate, or a more important relief from any medicine whatever, than by taking large and repeated doſes of this very eſſential ſalt, the *Cremor Tartari*; and when it appears, that Dr. Hillary greatly depended on it for the cure of the dry-belly-ach in the Weſt-Indies? Zeller, in his *docimaſia*,

ſigna, cauſæ, & noxa vini lithargyrio mangoniſati, gives an account of the revival of the adulteration of wine with litharge in the Duchy of Wirtemberg, in the beginning of the preſent century. In this diſſertation he aſſerts, that though the wines, in the neighbourhood of Tubinga, were as acid as vinegar, the inhabitants had long drunk them with impunity, 'till this fraud was introduced. "Conſtat viciniam "noſtram, ubi alias montes lachry- "mantur, acetum, et iſtiuſmodi vina "immatura et acida per plures annos, "imo luſtra ab incolis & militibus "largiter hauſta fuerunt, ab omnibus "tamen his ſymptomatibus penitus "liberam fuiſſe, cum a fuco quoque "libera fuerit: Imo in ipſa hac noſtra "Civitate, quæ ante duo luſtra tru-

"culentia

" culentia hac tantum non oppreſſa
" fuit, poſtquam fraudem hanc plu-
" rimi tam Vietores, quam Caupones,
" tecte quidem exercuerunt, omnes
" iſti, qui a Cauponibus vinum vel
" non emerunt, vel in eorum ædibus
" non biberunt, a torminibus et cru-
" ciatibus hiſce immunes evaſerunt;
" licet eorum domeſtici per aliquot
" annos auſterum & acidiſſimum hau-
" ſerint vinum, ut acidius guſtari vel
" dari nequeat; aliis interea, quos
" dulcedo inſcavit, miſerrime pa-
" tientibus, aut enervatis, elumbibus
" redditis, pendulis artubus et reſolutis
" incedentibus, aut neci traditis; plu-
" rimi enim miſerrime perierunt."

The experiment, mentioned by Zeller, proves nothing againſt the general wholeſomeneſs of acids. Upon his

giving to a Dog three ounces and an half of very ſtrong vinegar, the reſpiration of the animal immediately became ſonorous and difficult; and he died in the third hour after he had ſwallowed the vinegar, having thrown up great quantities of froth, which at laſt was mixed with blood. The Dog being opened, no ſigns of inflammation appeared in the ſtomach: the miſchief is deſcribed to have been in the lungs only. Some of the vinegar probably found its way into the lungs; and ſuffocation ſeems to have commenced in the very act of ſwallowing. Whereas Brunnerus, *(Ephemerid. Germanic. an.* 4. *obſervat.* 92.) who killed a Dog with an ounce of powder of litharge, diſſolved and boiled in vinegar, found the effects of that poiſon to be principally

pally in the ſtomach, inteſtines, urinary bladder, and the reſt of the *viſcera* of the *abdomen*.

I ſhall only add one more obſervation concerning acids. Phyſicians, who have reſided ſome time in the hotter countries, have teſtified, that there are no better remedies againſt ſpaſms, dyſenteries, and the other endemial diſeaſes in hot climates, than the acid vegetables, with which Nature has moſt liberally ſupplied the warmer countries. This opinion is expreſſed in a ſtrong manner by Jacobus Bontius in his *Hiſtoria Naturalis Indiæ Orientalis*, *lib.* vi. *cap.* 27. "Videtur "Natura voluiſſe ex profeſſo multas "acidas et conſtringentes herbas e "terra producere contra violentos & "endemios morbos, dyſenteriam nem-

"pe,

" pe, choleram, & ſpaſmum, plerum-
" que a Bile ortos: ut quaſi digito
" monſtraret, ubi hæc vel ſimilia mala
" naſcuntur, ibi locorum remediorum
" manifeſta et etiam occulta qualitate
" pugnantium penuriam non fore."

It ſeems therefore not to have been without ſufficient foundation, that I have for ſome time ſuſpected, that the cauſe of this Colic is not to be ſought for in the pure Cyder; but in ſome, either fraudulent, or accidental, adulteration.

Upon inquiry, I find that the diſeaſe is very common all over the county of Devon; but that it particularly infeſts thoſe parts of the county, where the greateſt quantities of Cyder are made. I likewiſe find that it is not only common among the lower claſs of inhabi-

tants,

tants; but that it is much more frequent among people of all ranks, than in other parts of England; and that it is not intirely confined to the autumnal ſeaſon. Not long ago I had an opportunity of ſeeing ſeveral wretched victims to this cruel diſeaſe; who anſwered to the repreſentation drawn by Citois. "Per vicos, veluti larvæ, "aut arte progredientes ſtatuæ, pallidi, "ſqualidi, macilenti conſpiciuntur, "manibus incurvis et ſuo pondere "pendulis, nec niſi arte ad os et cæte"ras ſupernas partes ſublatis, ac pe"dibus non ſuis, ſed crurum muſculis, "ad ridiculum, ni miſerandum, in"ceſſum compoſitis, voce clangoſa &c "ſtrepera."

I lately received from Dr. Andrew of Exeter the following account of

all the Patients, under this diſeaſe, admitted into the hoſpital at Exeter ſince September 1762.

From Sept. 1762 to Sept. 1763	—	72
Sept. 1763 to —— 1764	—	73
Sept. 1764 to Lady-Day 1766	—	86
Lady-Day 1766 to July 6, 1767	—	52
		285

Of this number 209 were cured.

Dr. Andrew likewiſe informs me, that Patients are brought to the Exeter hoſpital from all parts of the county; but chiefly from thoſe parts, where moſt cyder is made.—That the moſt violent ſymptoms of this diſorder, ſuch as pain and coſtiveneſs, are generally removed, before the ſick are brought to the hoſpital; and that nothing commonly remains but a paralytic weak-

neſs

neſs in the arms. Dr. Andrew adds, "I have known this complaint cured "radically; tho' I confeſs, a return "often happens. When the diſeaſe "proves obſtinate, we always endea-"vour to get our Patients into the "hoſpital at Bath; the Bath-water, "tho' not a ſpecific, being eſteemed "by us the moſt effectual reme-"dy, both internally and externally "uſed."

According to my information, eighty Patients, under the effects of the Devonſhire colic, were admitted into the Bath-hoſpital in the courſe of the laſt year; forty of whom are ſaid to have been cured, and thirty-ſix ſent away greatly relieved. I likewiſe am informed from the Bath-hoſpital, that the proportion of ſuch Patients from

Devonſhire, to that from the counties of Hereford, Glouceſter, and Worceſter, is generally as eight to one.

In ſome letters, which I have lately received from Dr. Wall, of Worceſter, the following facts are mentioned. "The counties of Hereford, Glouceſter, and Worceſter, are not, ſo far as I know, ſubject to the colic of Poitou, or any other endemic illneſs, unleſs it may be the rheumatiſm; which, I think, the inhabitants of Herefordſhire are more liable to, than thoſe of ſome other counties. There is no Lead, which can give occaſion to that colic, uſed in any part of the *apparatus* for grinding or preſſing the apples, or fermenting the liquor. Once indeed, in a plentiful year of apples, I knew a Farmer,

" who, wanting caſks, filled a large
" leaden ciſtern with new cyder, and
" kept it there, till he could procure
" hogſheads ſufficient to contain the
" liquor. The conſequence was, that
" all who drank of it were affected by
" it as the Lead-workers uſually are.
" We had eleven of them, at one
" time, in our Infirmary.

" I have lately had two or three
" Patients in that diſtemper, occa-
" ſioned by their having drunk cyder
" made in a preſs covered over with
" Lead. But this fact of a cyder-preſs
" covered with Lead, is a ſingular, and
" perhaps the only inſtance of the
" kind in this part of England. It
" happened in a part of the county of
" Worceſter, adjoining to Warwick-
" ſhire, where very few apples grow ;

" and

" and the bed of the preſs being there-
" fore cracked by diſuſe, the ſagacity
" of the Farmer contrived this cover-
" ing, to prevent a loſs of his liquor.
" In general, the cyder-drinkers with
" us are healthy and robuſt; but for
" the moſt part lean. The liquor is
" clear, and paſſes off readily by urine
" and perſpiration; which enables the
" common people to drink immenſe
" quantities of it when at labour, to
" the amount of ſeveral gallons in a
" day. I have heard it obſerved by a
" Phyſician, late of this place, who
" was much concerned in the cure of
" Lunatics, that more of thoſe unhappy
" Perſons came to him from Hereford-
" ſhire, than any other place. The fact,
" if true, may poſſibly ariſe from the
" quantity drunk, rather than the qua-
" lity."

Were

Were the *apparatus* for making cyder the ſame in all the cyder-counties, it would appear very remarkable, that the inhabitants of one county ſhould experience ſuch terrible effects from the uſe of this liquor, while thoſe of the other counties drink it with impunity. But, if we inquire into the method of making cyder in the county of Devon, we ſhall be able to conjecture with ſome degree of probability, what it is that occaſions ſuch a difference. The large circular trough, in which the apples are ground, is generally compoſed of ſeveral pieces of moor-ſtones, cramped together with iron, ſome melted Lead being poured into the interſtices. It frequently happens, that theſe ſtones, which are thus to be joined, are unequal, and do not

correſpond

correſpond with each other; ſo that conſiderable chaſms are left between them; and theſe chaſms are filled up with Lead. In this caſe the apples, ground by the preſſure of the roller, immediately come in contact with no ſmall quantity of this poiſonous mineral.

It is likewiſe common, in ſeveral parts of the county, either to line the cyder-preſſes entirely with Lead, in order to prevent their leaking; or to make a border of Lead quite round the preſs, in order to receive the juice of the apples, and to convey it into a veſſel, made of wood or ſtone, placed underneath. And in many other places, where theſe methods are not uſed, it is common to nail ſheet-lead over any cracks or joints in the preſſes; and likewiſe to convey the juice of the apples

from the preſſes in leaden pipes. Moreover I am informed, that it is the practice of ſome Farmers, in managing their weak cyder, made early in the year, before the apples are ripe, to put a leaden weight into the caſks, in order to prevent the liquor from growing ſour; and that this cyder is the common drink of their ſervants and labourers. But I am willing to believe, that this pernicious method of adulteration (againſt which ſevere laws have been enacted, as well in France as in Germany, and which crime, in both countries, is deſervedly puniſhed by death) is not often practiſed by our countrymen.

Dii meliora piis, erroremque hoſtibus illum!

Dr. Wall informs me, that in ſome parts of the counties of Hereford, Glouceſter,

Glouceſter, and Worceſter, the mills, in which the apples are ground, being 16, 18, or 20 feet in diameter, conſiſt of ſeveral pieces of ſtone or timber, joined together with cramps of iron, faſtened with Lead: but that theſe cramps are fixed in the *bed* of the mill, or on the outſide of the curb, and not in the groove where the apples are ground. The ſame Gentleman obſerves, that, if many apples, full of juice, lie long on the *bed* of the mill, (where the apples are placed in an heap, that they may be ready to be thrown into the groove,) ſome of which may perhaps be rotten, others bruiſed in the gathering, and a moiſture ſpread over the whole, from the fermentation and ſweating of the fruit, it may perhaps be doubted, whe-

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ther ſome part of the Lead, uſed in the cramps, may not be diſſolved; tho' it muſt be, at moſt, in a quantity extremely ſmall; there being but very little Lead uſed in the junctures; and the ſurface expoſed to the apples being almoſt imperceptible. But I am informed by another perſon, that in many parts of Herefordſhire, and the neighbouring counties, the ſtones of the mills, are joined together with putty; (which is whiting, mixed with oil into a tough paſte) and that neither iron nor Lead are originally uſed in the conſtruction of them; but that, if any of the joints, in wearing, happen to ſtart (which is ſometimes the caſe) they are repaired with iron cramps faſtened with lead.

Theſe facts having been well aſcertained, I determined to make uſe of

the first opportunity, which might occur, of informing myself by experiment, whether or no there are really marks of a solution of Lead in the cyder of Devonshire. Being therefore, in the month of October 1766, at Exeter, I procured some of the expressed juice of apples, as it flowed from a cyder-press, lined with Lead, in the parish of Alfington. On this I made and repeated several experiments by means of the *atramentum sympatheticum*, or *liquor vini probatorius* described by *Neuumann*; and of the volatile tincture of sulphur. These experiments intirely satisfied me, that the Must contained a solution of lead. The same experiments were made on some cyder of the preceding year. This likewise shewed evident signs of lead contained in it; but in less proportion than in the Must. But,

But, being unwilling to make any poſitive aſſertion, ſolely on the authority of my own trials, more eſpecially as I had been under the influence of a preconceived opinion; I brought with me to London ſome of the ſame Muſt, which I had examined at Exeter. This Muſt, together with ſome Devonſhire cyder of the preceding year, which I purchaſed of the maker, (who aſſured me that he uſed no Lead in any part of the *apparatus* for making cyder, except only what is neceſſary for compoſing the trough, as was mentioned above,) were the ſubject of ſome experiments, in making which, Dr. Saunders, an ingenious Gentleman, who teaches Chemiſtry, kindly gave me his aſſiſtance.

Before I give an account of the ſeveral experiments, which we made, in

order to aſcertain this adulteration, it may be proper to make a few obſervations, which will perfectly explain the mode of union, which takes place between wine, or cyder, and lead.

The expreſſed juice of the grape, or of the apple, has a conſiderable quantity of acid united with the ſaccharine matter. This juice, when ſubjected to fermentation, has its acid, during the progreſs of that fermentation, gradually aſſimilated and converted into an alcohol or inflammable ſpirit. But if the original juice, or Muſt, be crude and acid, without having much ſaccharine matter in it, the native acid is with difficulty aſſimilated; or, when it arrives at the proper period of aſſimilation, it does not remain there ſtationary, but haſtens on to the acetous fer-

fermentation. When lead is added to ſuch wines, their acidity is covered; a ſweetneſs is communicated to them; and their acetous fermentation is checked.

The richer wines, of which the original juice contains a large proportion of ſaccharine matter, are leſs liable to adulterations of this kind, than the poorer wines of northern climates, ſuch as the Rheniſh and the Moſelle wines, and our Engliſh cyder.

It is here to be obſerved, that the vegetable acid, either in its native ſtate of Muſt, or in its fermented ſtate of vinegar, or in its intermediate ſtate of cyder, very readily receives an impregnation from Lead, whether it be applied in its metallic or calcined ſtate. We are therefore to conſider Lead, when united

united with wines, as in the condition of *ſaccharum Saturni*.

By attentively obſerving the variety of changes produced by certain bodies, when added to a ſolution of *ſaccharum Saturni*; and by applying theſe obſervations to the wines, which are the moſt frequent ſubjects of this adulteration, Chemiſts have been enabled to detect ſuch frauds, wherever they have exiſted.

EXPERIMENT I.

A ſmall quantity of Devonſhire cyder being expoſed upon clean paper to the fumes of the volatile tincture of ſulphur, became immediately of a darkiſh colour, approaching to black. And we could only imitate this colour by expoſing a dilute ſolution of *ſaccharum Saturni* to the

the ſame fumes. A ſmall quantity of cyder, made in the county of Hereford, expoſed in like manner to the ſame fumes, exhibited no ſuch appearance, until a few drops of a ſolution of *ſaccharum Saturni* were added to it.

Observation I.

From this experiment we are to underſtand that the acid, before united with the Lead in the cyder, and the volatile alkali in the tincture of ſulphur, mutually attracted each other; and that it was the precipitate of the Lead united with the ſulphur, which produced the dark colour above-mentioned.

Experiment II.

A ſmall quantity of *Hepar Sulphuris* prepared by digeſting together in a

ſand-heat one ounce of orpiment, and two ounces of quick-lime, with twelve ounces of water, in a cloſe veſſel) being added to ſome Devonſhire cyder, in a few minutes occaſioned a darkiſh colour in the body of the liquor, approaching to black; and the whole became very opake. No ſuch change was produced in the cyder of the county of Hereford, until a few drops of a ſolution of *ſaccharum Saturni* were added; when the ſame appearance, which was produced in the Devonſhire cyder, was perceived.

Observation II.

The reaſoning, made uſe of in the former obſervation, is applicable here. The decompoſition of the *ſaccharum Saturni* and of the *Hepar Sulphuris*

was

was effected by the ſame laws of elective attraction.

EXPERIMENT III.

To a ſmall quantity of Devonſhire cyder a few drops of *Hepar Sulphuris* (prepared by boiling equal parts of fixed vegetable alkali and ſulphur together in water) were added; and a precipitation of a very dark colour was produced.

When ſome Herefordſhire cyder was treated in the ſame manner, the precipitate produced was as white as milk; and it was only upon the addition of a few drops of a dilute ſolution of *ſaccharum Saturni*, that a precipitate of the ſame colour with the former could be obtained.

Observation III.

There is ſome nicety required in making this experiment. The *Hepar Sulphuris* is not to be added in any large quantity; for as all the lead is precipitated upon the firſt addition, it it is eaſy to perceive the ſeveral ſucceſſive ſhades of colour in the precipitate, until all the lead is ſeparated; and then the precipitate, upon a farther addition of *Hepar Sulphuris*, aſſumes the whiteneſs of the precipitate obtained from the Herefordſhire cyder, which intitles it to the appellation of *Lac Sulphuris*. If a large quantity of *Hepar Sulphuris* be at once added, the whiteneſs of the too copious precipitate is ſuch, as to render the dark colour of what is firſt precipitated imperceptible.

Ex-

Experiment IV.

Some Devonſhire cyder was examined by means of the volatile tincture of ſulphur, as in Experiment III. A very dark coloured precipitate was obtained. A ſimilar precipitate could only be obtained from Herefordſhire cyder, after that a weak ſolution of *ſaccharum Saturni* was added to it.

Some of the Muſt (taken from the preſs in the pariſh of Alfington, as was mentioned above) treated in the ſame manner with the cyder, produced precipitates of a deeper black colour. This ſufficiently ſhews, that the ſolution of Lead in the Muſt was ſtronger than that in the cyder.

It is a matter of no conſequence, whether the Lead, the exiſtence of

which is proved, was applied to the cyder in its ſtate of Muſt, or in that of a vinous liquor. However, as the muſt afforded more conſiderable ſigns of impregnation than the cyder, it would ſeem probable that the lead was added to the Muſt; and that, as the acid, during the fermentation, is in a great meaſure converted into alcohol, a proportional quantity of lead will conſequently be precipitated.

The ſame experiments were afterwards tried on ſeveral other ſpecimens of Devonſhire and of Herefordſhire cyder. The reſult of them was conſtantly and uniformly the ſame as has been deſcribed.

It has been propoſed by ſeveral Authors, to detect ſuch adulterations of wines by means of the vitriolic or of the

mu-

muriatic acid; which, by uniting with the lead, will make it precipitate. But it is aſcertained by the experiments, made by Profeſſor Gaubius, that trials, made with the acids, are leſs concluſive than thoſe which have been deſcribed.

Experiment V.

In order to leave the matter entirely without doubt, an extract from 18 common quart bottles of Devonſhire cyder (firſt ſtrained through a cloth) which had been in my cellar more than three months, was prepared. This extract, being aſſayed with the black flux, a quantity of Lead, weighing four grains and an half, was found at the bottom of the crucible. Theſe experiments were made in October 1766.

In

In the latter end of the laſt century, when the phyſicians of Germany (particularly Vicarius, Cockelius, and Brunnerus, whoſe diſſertations on this ſubject may be found in the *Ephemerides Germanicæ*) had taken great pains to diſcover the true cauſe of the epidemic colic, which, to uſe the language of Brunnerus, (*Ephemerid. Germanic. Dec.* 3. *an.* 4. *obſervat.* 92.) "non "minus ægrotantium viſcera, quam me-"dentum animos, torſerat;" And when they had at laſt demonſtrated, that this diſorder was wholly to be referred to ſmall acid wines, adulterated with litharge, there appeared a writer (a certain Seerup, a phyſician of Copenhagen) who endeavoured to exhibit a ſpecimen of his reading and ingenuity, by maintaining a bold paradox. This man,

man, in very pompous language, and with an air of the greateſt confidence, aſſerted in his *triumphus lithargyriatorum*, that no danger was to be apprehended from wines in which litharge was diſſolved; and that all the ill effects, ſuppoſed to have been derived from that cauſe, were really to be attributed to the auſtere acid of wine made of unripe grapes. This opinion he endeavours to defend by the authority of Drawitzius, Sennertus, Van Helmont, Theodorus Zwinger, Boyle, Wepfer, and ſeveral other Writers. He likewiſe quotes ſeveral authors, to ſhew the ſalutary effects produced in the human body by the internal uſe of lead; and inſiſts, in virtue of their teſtimony, that it had cured affections of the ſpleen, ariſing from an acid cauſe; the

hypochondriacal diſeaſe; ſudden inflammations; colics occaſioned by the *Bilis æruginoſa*; obſtinate quartan fevers; ulcerations of the lungs, as well as of other parts; and the plague itſelf. He adduces other authorities to ſhew, that the *Aqua Saturni* had been of very great uſe in diſorders occaſioned by worms; that the *Spiritus Saturni* had cured the leproſy; that Paracelſus held it to be a ſpecific remedy in madneſs; and that in the ſmall-pox, and all other inflammations, it had been proved to be an efficacious medicine: That it was the great ſudorific medicine of Faber; and that it was Mynſicht's ſecret for the cure of the *phthiſis*, and diſeaſes of the ſpleen and colic; and that the great ſucceſs, which had attended the practice of

Petrus

Petrus Matthias was to be aſcribed to the uſe of *Saccharum Saturni*, and other preparations of lead: and laſtly, that a conſtipation of the belly could not juſtly be attributed to *Saccharum Saturni*, ſince Antonius de Heide aſſerts, in his medicinal obſervations, that he cured that diſorder by adminiſtering to his Patients five grains of that remedy, mixed with Crabs-eyes.

It is preſumed that, the preſence of lead in the Cyder of Devonſhire being demonſtrated, there is no one, at this time of day, likely to revive the argument of Seerup, and ſtill inſiſt on the deleterious quality of the acid: For a poiſon is diſcovered, which is experimentally known to be adequate to all thoſe dreadful effects, ſo pathetically deſcribed by Dr. Huxham. It is like-

wiſe preſumed that no opinion, unſupported by facts and experience, (how reſpectable ſoever the character of its author may be) will be admitted in evidence, when contraſted with the authority of a fact, which ſeems to be clearly demonſtrated to our ſenſes.

The general character of lead, and the preparations of lead, when given internally, has been, that they cool, incraſſate, repel, abſorb, and obtund acrimony. And it is very well known, that their real power has, in many inſtances, ſeemed to anſwer to ſuch a general character; for there are ſcarcely any medicines, which produce their effects more immediately, or with greater certainty, in colliquative ſweats, in fluxes, and in hæmorrhages. But it is as well known,

known, that the relief given, which, for the moſt part, is only temporary, has been frequently followed by violent pain in the bowels, obſtinate coſtiveneſs, ſuppreſſion of urine, tremors, ſpaſms, palſy, aſthma, and ſuffocation. And altho', if we give credit to the teſtimony of credible writers, we muſt allow that Patients, of certain conſtitutions, may have taken theſe medicines with ſucceſs, and with impunity; yet ſurely Phyſicians cannot be too cautious in avoiding the uſe of medicines, the effect of which, for aught that they can preſume to aſcertain, may be more formidable than the diſeaſes to which they are oppoſed. That preparations of lead were formerly very faſhionable medicines, we may judge from the oldeſt diſpenſato-

ries, in which we find an almoſt infinite number of Magiſteries, Elixirs, and Balſams, which have that metal for their *baſis*.

We are informed by Mr. de Haen, that the uſe of theſe medicines is much more common even now than is generally imagined. He thinks that the number of Patients, affected by the colic of Poitou, is immenſely increaſed by ſuch means. He mentions the *formula* of a medicine, compounded of ℈i of *Saccharum Saturni*, ʒi of Ceruſſe, and ʒvi of water. By this medicine taken *cochleatim*, a Patient, he ſays, was cured of a *gonorrhœa*; but ſoon afterwards was ſeized with the moſt excruciating pain in his bowels, followed by a vomiting of his excrements. He adds, that this man,

tho' he eſcaped death, even after three years, felt and lamented the reliques of that moſt dreadful cure. I could quote from my own experience more than one inſtance of caſes, in ſeveral reſpects ſimilar to this, which I have taken from Mr. de Haen's *ratio medendi*.

What then can we think of the practice of the Chineſe, who very frequently adminiſter internally various preparations of lead, to which they aſcribe extraordinary virtues? The obſervation made on this ſubject by Mr. Malouin, in his *Chymie Medicinale*, ſeems judicious. " En réfléchiſſant " ſur l'uſage interieur que les Chinois " font du Plomb, on eſt porté à croire " que ces peuples ſont differemment " conſtruits

" conſtruits ou tempérés ; ou que leur " Plomb differe du nôtre."

Dr. Huxham finds it a difficulty to account for the reaſon, " why the juice of apples in one year produces a coſtive belly, with violent colical pains, but in another, a looſe belly with ſcarce any gripes attending." I have been informed by others, that ſmall quantities of new cyder will frequently produce a *diarrhœa* in every year. But Citois obſerves, that the colic, which infeſted the inhabitants of the province of Poitou, was often attended, " per " initia præſertim, cum alvi frequenti, " ſed non ita copioſo, fluore, ſæpius " cum ejuſdem adſtrictione." M. Douzam, who writes on this diſeaſe in the *journal de medicine* for the month of October, 1760, affirms that " Il en

eſt

« eſt pluſieurs, qui non ſeulement « n'ont point éprouvé de conſtipation, « mais même qui ſe ſont plaints d'un « flux de ventre." The ſame thing is ſometimes obſerved in the caſe of painters, and of other workmen employed about Lead. Some of them are cured by a ſpontaneous looſeneſs of the belly. Mr. James Wilſon, who (in the Eſſays and Obſervations phyſical and literary, publiſhed at Edinburgh, Vol. 1. Art. 22.) gives an account of a diſeaſe, called by the miners Mill-reek, which all the inhabitants of Lead-Hills are ſubject to, but particularly thoſe, whoſe daily buſineſs it is to melt down the Lead, obſerves, that, in the firſt ſtage of this diſeaſe, a diarrhœa ſometimes makes a cure.

A queſtion

A queſtion may be aſked, "If the "miſchiefs occaſioned by Cyder, par-"ticularly when it is new, ariſe from "the poiſon of lead diſſolved in it, "how happens it, that all, who drink "this liquor, do not ſuffer in propor-"tion to the quantity of poiſon ſwal-"lowed; and that ſome people, who "have long accuſtomed themſelves "to it, have never experienced any "of its bad effects?" This difficulty, (which is in its full force, whatever general cauſe be ſuppoſed) can only be ſolved by recurring to that inexplicable *idioſyncraſia*, in which there is ſo remarkable a difference among men. But it is likewiſe to be remembered, that the Phyſicians of Germany, who, in the latter end of the laſt, and in the beginning of the preſent

preſent century, wrote concerning wine adulterated by litharge, and the general effects of it, made the ſame obſervation. The words of Zeller are, " Multi tamen, imo innumeri ab eo " læſi non fuerunt, utut ad ebrieta- " tem uſque illud hauſerint; alii levi- " ter tantum."

I ſhall only add, that it will not be eaſy to determine the exact quantity of lead diſſolved by the acid of Cyder, unleſs an evaporation and an aſſay be made, as ſoon as the juice is expreſſed. For it ſeems probable, that, as it happened in the caſe of the adulterated wines of Germany (which, we are informed, after a few months, loſt that apparent, but pernicious improvement, which fraud had given them) the Cyder may, in ſome time, depoſit

the greateſt part of its poiſon. But that a very ſmall quantity of this poiſon is capable of producing moſt terrible effects, is certain from what was formerly obſerved in Germany. For a calculation having been made, according to the method of adulterating wines which is deſcribed by Cockelius, a meaſure of wine, called the *menſura Wirtenburgica major*, (which Reiſelius eſtimates at ſixty-four ounces) ſcarcely contained one half of a grain of litharge.

May not I preſume to hope, that the preſent diſcovery of a poiſon, which has for many years exerted its virulent effects on the inhabitants of Devonſhire, incorporated with their daily liquor, unobſerved, and unſuſpected, may be eſteem-

ed by thoſe, who have power, and who have opportunities to remove the ſource of ſo much miſchief, to be an object worthy of their moſt ſerious attention? I have long lamented, that a County, which is diſtinguiſhed by ſome peculiar bleſſings, ſhould likewiſe be diſtinguiſhed by a peculiar calamity, as it were in conſequence of its fertility. The ſubject therefore having appeared to me important, I have ſpared no pains in this inveſtigation; and I am inſured of my reward in the conſciouſneſs of having endeavoured to preſerve my countrymen and fellow-creatures from one of the moſt dreadful diſeaſes, incident to the human body.

This eſſay will probably be hereafter publiſhed in a medicinal collection. Some copies of it are now printed, with a particular

ticular view of giving to the inhabitants of the county of Devon the earlieſt intimation of their danger; in order that they may take the proper ſteps to preſerve their health, and to ſecure the value of their property.

FINIS.

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